CTPS CENTRAL TRANSPORTATION PLANNING STAFF

Staff to the Boston Metropolitan Planning Organization

DRAFT MEMORANDUM

TO: Red-Blue Connector Project Files **Nov. 2, 2009**

FROM: Nand Sharma

RE: Red-Blue Connector Study

SUMMARY

This memo summarizes the results of the environmental justice analysis conducted for the Red-Blue Connector project. The analysis was conducted using the regional travel demand model and readily available geographic and spatial information. The analysis examines how Red-Blue Connector proposed build alternatives affect the travel accessibility and mobility of environmental justice communities in Boston and Cambridge. The analysis was based on the future year (2030) travel forecasting done in connection with the Red-Blue Connector project.

Definition of Environmental Justice Communities

As interpreted from federal guidance, the MPO should recommend transportation projects that do not burden environmental justice areas when compared to a scenario without those projects. The definitions for the EJ zones are as follows:

EJ Area (for outreach and accessibility analysis):

An environmental justice area is defined as one or more TAZs that both (1) have a total minority (non-white or Hispanic) population of over 200 residents and (2) meet one or both of the following criteria:

- *Low Income:* A median household income at or below 60 percent of the 2000 MPO-region median household income (60 percent of the region’s median household income of $55,800 is $33,480).

- *Minority:* A population that is more than 50 percent minority (non-white or Hispanic).

EJ Population Zone (for mobility, congestion, and environmental analysis):

An environmental justice area is defined as one or more TAZs that both (1) have a total minority (non-white or Hispanic) population of over 200 residents and (2) meet one or both of the following criteria:

- *Low Income:* A median household income at or below 80 percent of the 2000 MPO-region median household income (80 percent of the region’s median household income of $55,800 is $44,640).

- *Minority:* A population that is more than 21.4 percent minority (non-white or Hispanic).

ANALYSIS

No-Build and Build Network

All of the build scenarios that are analyzed in this memo are examined in relation to a no-build scenario. To understand the results presented in this memo it is important to note some key features of the forecast year no-build transit network. In the forecast year no-build transit network the red and the blue line is not connected at the Charles MGH station. Also Bowdoin is in the current position and is not relocated. The first build alternative – MT- 3B has the blue Line extension to Charles MGH Station using a mined tunnel construction technique and the relocation of the Bowdoin Station. The second Build Alternative - MT-2C has the blue Line extension to Charles MGH Station using a mined tunnel construction technique and the elimination of the Bowdoin Station.

Accessibility to Jobs

This statistic measures whether a build alternative provides greater access to employment as compared to a no-build alternative. It measures the change, for environmental and non-environmental justice zones, in the number of basic, retail and service jobs that are within forty minutes transit time of the study communities. The analysis accounted for in-vehicle as well as out of vehicle transit travel times. The transit access percentages in Table 1 (below) represent the change, as between the no-build and a build alternative, in the number of jobs that are within 40 minutes transit travel time of environmental justice and non-environmental justice zones in Cambridge and Boston. The transit time percentages in Table 1 represent the change, as between the no-build and a build alternative, in the transit travel time from environmental justice and non-environmental justice zones in Boston and Cambridge to all other zones. The change from the no build-to-build scenerio is very little since the analysis area is a highly developed transit area. The output numbers were very small for this study and only numbers that were .1% and greater are included here.

TABLE 1 ACCESSIBILITY TO BASIC, RETAIL AND SERVICE JOBS

	BOSTON BASIC EMPLOYMENT PERCENTAGES				**BOSTON RETAIL EMPLOYMENT PERCENTAGES**				**BOSTON SERVICE EMPLOYMENT PERCENTAGES**			
	TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME	
	EJ	**NonEJ**	**EJ**	**NonEJ**	**EJ**	**NonEJ**	**EJ**	**NonEJ**	**EJ**	**NonEJ**	**EJ**	**NonEJ**
MT-3B	0%	0%	0%	0%	0%	0%	0%	0%	.1%	0%	0%	0%
MT-2C	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

	CAMBRIDGE BASIC EMPLOYMENT PERCENTAGE				CAMBRIDGE RETAIL EMPLOYMENT PERCENTAGE				CAMBRIDGE SERVICE EMPLOYMENT PERCENTAGES			
	TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME	
	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ
MT-3B	0.6%	0.3%	0%	0%	0.3%	0.1%	0%	0%	0.0%	0.0%	0%	0%
MT-2C	0.6%	0.3%	0%	0%	0.3%	0.1%	0%	0%	0.0%	0.0%	0%	0%

	REVERE BASIC EMPLOYMENT PERCENTAGES				REVERE RETAIL EMPLOYMENT PERCENTAGES				REVERE SERVICE EMPLOYMENT PERCENTAGES			
	TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME	
	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ
MT-3B	.9%	.1%	0%	0%	.9%	.1%	0%	0%	1.7%	.5%	0%	0%
MT-2C	.9%	.1%	0%	0%	.8%	0%	0%	0%	1.6%	.5%	0%	0%

As TABLE 1 (above) shows, Boston and Cambridge areas do not experience much change in accessibility. The areas are already transit developed areas, and as expected Red-Blue connector does not add much to accessibility. The total savings due to the red-blue connector is about 4 minutes. Such savings in a transit rich area is not expected to lead to an increase in the accessibility of the area. As seen in the table, there are some positive results in the Cambridge area and that is due to the fact that there are some benefits associated with the 4-minute travel timesavings for people who are traveling on the blue line and with final destination to the Cambridge area. Boston does not see the same amount of benefits as Cambridge since Cambridge experiences more travel timesavings. Also Cambridge experiences more growth in Basic and Retail jobs accessibility since the Service jobs are high in the Cambridge area and thus a small change in magnitude does not bring any noticeable change in the percentage. The accessibility in the revere area increases as a result of the red-blue connector and has a noticeable change. We see more change in the service employment since there are more service jobs in Cambridge area and that would experience more accessibility.

Accessibility to Universities and Colleges

This statistic in Table 2 (below) measures whether a build alternative provides greater access to colleges and hospitals as compared to a no-build alternative. Transit access measures the change in the number of college enrollment slots and hospital beds within forty minutes of environmental and non-environmental justice zones as between a no-build and build alternative. Transit time measures the change in transit time as between a no-build and build alternative from environmental and non-environmental justice zones to all destinations. The analysis accounted for in-vehicle as well as out-of-vehicle transit travel times.

A pattern similar to the employment accessibility results emerges with college enrollment and hospital beds in the Boston and the Cambridge Area. Transit accessibility to colleges and hospitals remains almost same from the no-build to build alternatives. There some is a slight increase in the hospital bed enrollments in the Boston area and this is due to the increased connectivity at the Charles MGH station provided by the red line and the blue line connection.

For revere, the accessibility to the hospital beds increases and that is a direct result of the red-blue connector providing more accessibility to the Charles MGH hospital.

TABLE 2 ACCESSIBILITY TO COLLEGES, UNIVERSITIES AND HOSPITALS

	BOSTON COLLEGE ENROLLMENT PERCENTAGES				BOSTON HOSPITAL BEDS PERCENTAGES			
	TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME	
	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ
MT- 3B	.0%	0%	0%	0%	0%	.2%	0%	0%
MT-2C	.0%	0%	0%	0%	0%	.1%	0%	0%

	CAMBRIDGE COLLEGE ENROLLMENT PERCENTAGES				CAMBRIDGE HOSPITAL BEDS PERCENTAGES			
	TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME	
	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ
MT- 3B	0%	0%	0%	0%	0%	0%	0%	0%
MT-2C	0%	0%	0%	0%	0%	0%	0%	0%

	REVERE COLLEGE ENROLLMENT PERCENTAGES				REVERE HOSPITAL BEDS PERCENTAGES			
	TRANSIT ACCESS		TRANSIT TIME		TRANSIT ACCESS		TRANSIT TIME	
	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ	EJ	NonEJ
MT- 3B	0%	0%	0%	0%	6.2%	.7%	.2%	.5%
MT-2C	0%	0%	0%	0%	6.1%	.5%	.1%	.5%

The college enrollments see a slight increase in the number but the percentage is less than .1% and is ignored as part of the table.

Mobility

This statistic is simply a change in the weighted average of travel time for trips produced from and attracted to the Boston and Cambridge EJ and non -EJ zones. A negative value represents a travel time - savings as compared with the no-build.

Table 3 Mobility: Change in weighted average Travel Time

Change in weighted average Production time from Boston		
	EJ	NonEJ
MT- 3B	0	0
MT-2C	0	0

Change in weighted average Attraction time to Boston		
	EJ	NonEJ
MT- 3B	0	0
MT-2C	0	0

Change in weighted average Production time from Cambridge		
	EJ	**NonEJ**
MT- 3B	0	0
MT-2C	0	0

Change in weighted average Attraction time to Cambridge		
	EJ	**NonEJ**
MT- 3B	0	0
MT-2C	0	0

Change in weighted average Production time from Revere		
	EJ	**NonEJ**
MT- 3B	0	0
MT-2C	0	0

Change in weighted average Attraction time to Revere		
	EJ	**NonEJ**
MT- 3B	0	0
MT-2C	0	0

The above tables indicate that there are no benefits (below .1% are ignored in this study) to the Boston, Cambridge and Revere in terms of mobility.